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COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL
AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENGINEERING



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16
1987
AIR QUALITY REPORT

DIVISION OF AIR QUALITY CONTROL

ONE WINTER STREET 8TH FLOOR
BOSTON, MASSACHUSETTS 02108

July 1988

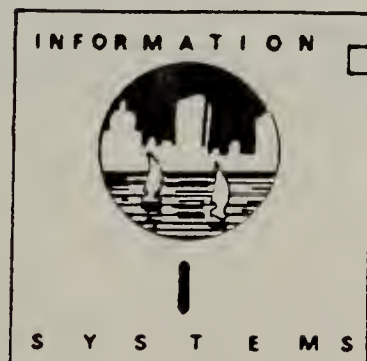
1987
AIR QUALITY REPORT

Project Author

Anita I. Beinikis

Project Manager

Robert Boisselle



Division of Air Quality Control
(617) 292-5630

1987 AIR QUALITY REPORT
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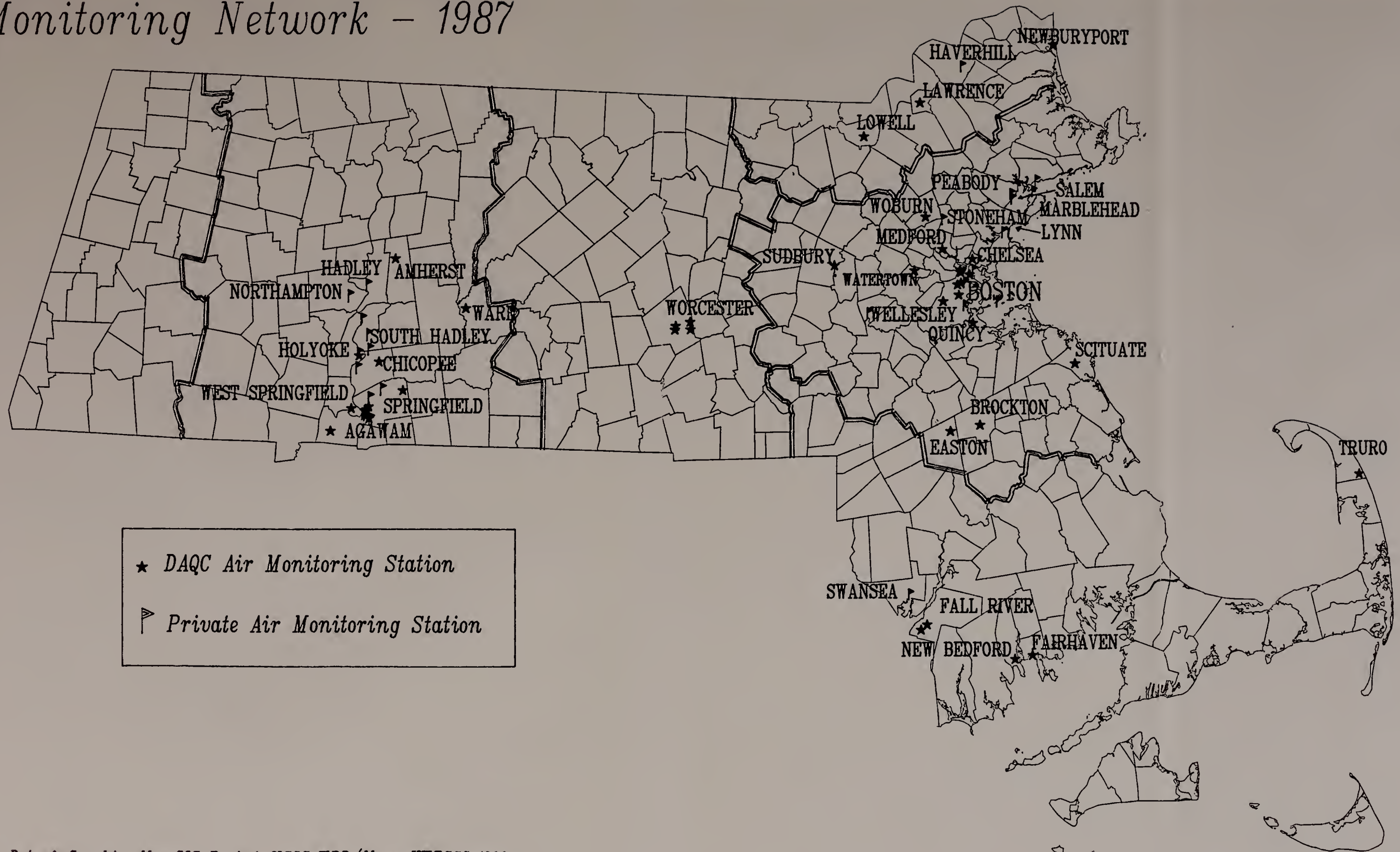
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DEQE - DAQC Air Quality Monitoring Network - 1987



I. INTRODUCTION

This report presents 1987 annual air quality data for Massachusetts, collected by the Division of Air Quality Control (DAQC), Department of Environmental Quality Engineering (DEQE). Data collected by the Commonwealth is also submitted to the U.S. Environmental Protection Agency (EPA) for inclusion into the National Aerometric Data Bank. DAQC is responsible for measuring ambient air quality to verify compliance with state and national standards (see Table 1), to support development of regulations designed to reduce ambient air contaminants, to assess the effectiveness of existing air pollution control strategies, to provide aerometric data for special research and to fulfill EPA reporting requirements (40 CFR 50) for air quality data. A site is considered in violation of the short term standards (e.g. 8 hour maximum) when the standard is exceeded two or more times in one year. In the case of ozone, a site is in violation if the hourly standard is exceeded four times in a three year span. Table 2 gives a brief description of the health and welfare effects of the six criteria air pollutants.

The Massachusetts network of public air monitoring stations, both urban and rural, are located throughout the state, at 40 sites. The stations are equipped with air pollution monitoring equipment (see Table 3) and, in some cases, meteorological equipment. The continuous state air pollution monitors record hourly levels of the four gaseous criteria pollutants - ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2). The non-continuous monitors record samples of 24 hour total suspended particulates (TSP), lead (Pb), and Particulate matter less than or equal to 10 microns (PM_{10}). Meteorological parameters measured, in most instances, include wind speed, wind direction, and temperature. The Commonwealth's ambient air monitoring network is complemented by a private network of

monitors. The private industrial sites are limited to monitoring sulfur dioxide, (SO_2) sulfates (SO_4), total suspended particulates, (TSP) wind-speed, wind direction and temperature.

Figures 2, 3, 5, 6, 7, 10 and 13 illustrate the Commonwealth's air pollution control regions and public monitoring networks maintained by DAQC in 1987 for the six criteria pollutants. TSP levels, replaced by PM_{10} as a particulate standard as of July 1987, are reported in Figure 8. Figures 4, 9 and 12 illustrate the private monitors in 1987 for SO_2 , SO_4 , and TSP.

This year, DAQC collected a total of 463,951 hourly samples at the public sites and 441,604 hourly samples at the private sites, for a total of 905,555 (see Figure 1). Daily Pollutant Standard Index values (April-October) were also determined for the Eastern, Central and Western portions of the state (see Table 14).

The Commonwealth's data from public and private monitors have been summarized in this report for public record and information. For further information pertaining to this report and other related air quality problems, please contact either the Division of Air Quality Control at Boston (617) 292-5630 or the Regional Offices.

AIR QUALITY REGIONAL SECTIONS

REGION 1 (Western)

John Higgins, Regional Director

Stephen Joyce, Deputy Regional
Environmental Engineer

David Howland, Section Chief-AQC
State House West
436 Dwight Street
Springfield, MA 01103
(413) 785-5327

REGION 2 (Central)

Barry Fogel, Acting Regional
Director

Michael Maher, Deputy Regional
Environmental Engineer

Thomas Cusson, Section Chief-AQC
Grove St.
Worcester, MA 01605
(617) 791-3672

REGION 3 (Metropolitan/Northeast)

Edward Kunce, Regional Director

Richard Chalpin, Acting Deputy
Regional Environmental Engineer

James Belsky, Section
Chief-AQC
5 Commonwealth Avenue
Woburn, MA 01801
(617) 935-2160

REGION 4 (Southeast)

Gilbert Joly, Regional Director

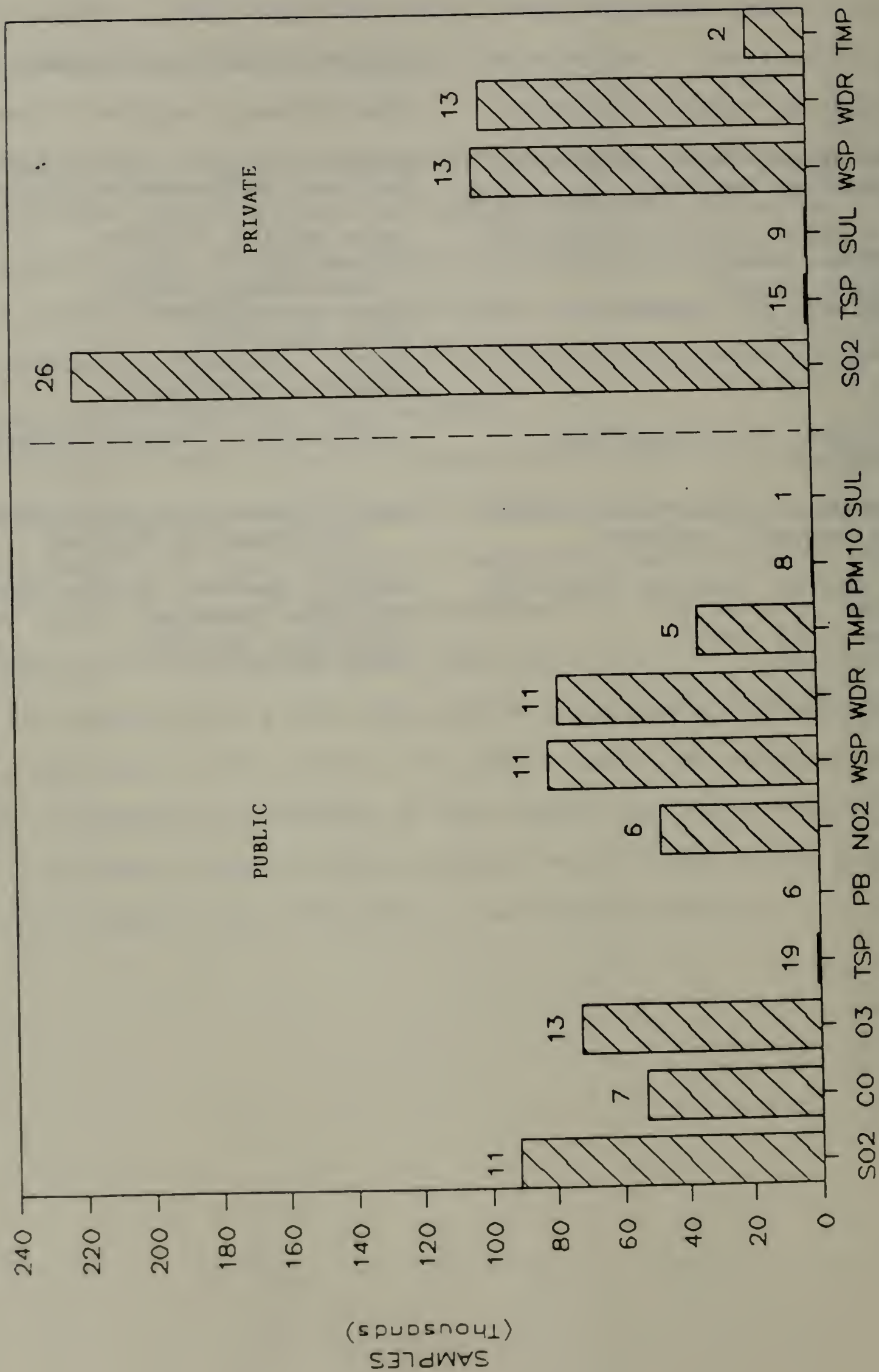
Robert Donovan, Deputy Regional
Environmental Engineer

Vaughan Steeves, Section Chief-AQC
Lakeville Hospital
Lakeville, MA 02347
(617) 947-1231

FIGURE 1

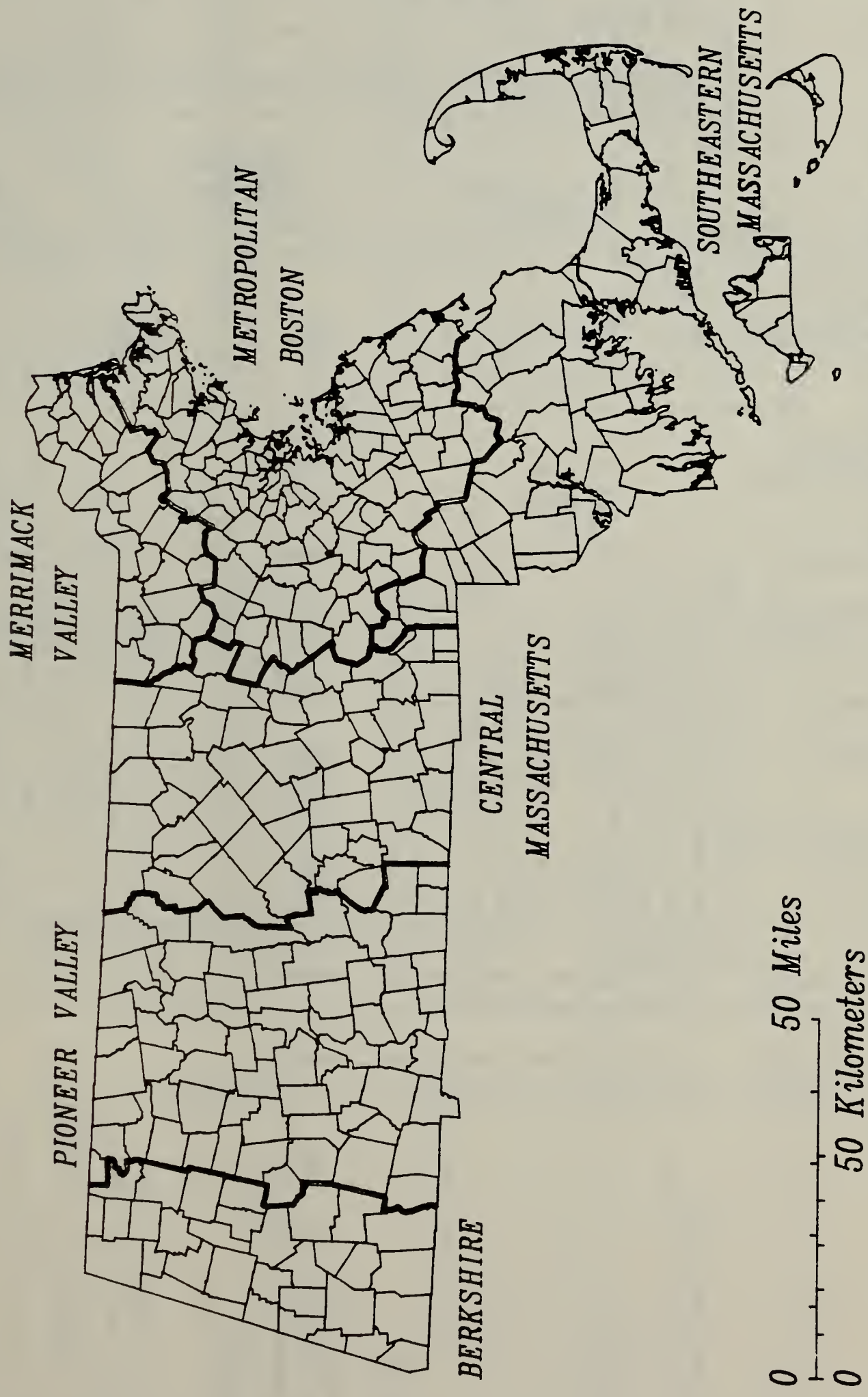
NUMBER OF SITES AND SAMPLES

In The Monitoring Network, 1987



17 = Number of Monitoring Sites
 SO2 = Sulfur Dioxide
 CO = Carbon Monoxide
 O3 = Ozone
 TSP = Total Suspended Particulates
 PB = Lead
 NO2 = Nitrogen Dioxide
 PM10 = Particulates ≤ 10 micrometers
 WSP = Wind Speed
 WDI = Wind Direction
 TMP = Temperature
 SUL = Sulfates

FIGURE 2: Massachusetts Air Pollution Control Regions



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWFSSC 1988

TABLE 1

STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS					
POLLUTANT	AVERAGING INTERVAL	PRIMARY STANDARD		SECONDARY STANDARD	
		ug/m ³	ppm	ug/m ³	ppm
Sulfur Dioxide	Annual	80	0.03	-	-
	24 hour	365	0.14	-	-
	3 hour	-	-	1,300	0.5
Carbon Monoxide	8 hour	10*	9	10*	9
	1 hour	40*	35	40*	35
Ozone	1 hour	240	0.12	240	0.12
Nitrogen Dioxide	Annual	100	0.05	100	0.05
Lead	3 month	1.5	-	1.5	-
PM ₁₀	Annual	50	-	50	-
	24 hour	150	-	150	-
Particulate Matter	Annual	75	-	60**	-
	24 hour	260	-	150	-

ug/m³ - micrograms per cubic meter
 ppm - parts per million

*mg/m³ - milligrams per cubic meter
 **annual average is considered a guideline

TABLE 2
HEALTH AND WELFARE EFFECTS OF AIR POLLUTANTS

POLLUTANTS AND THEIR SOURCES	HEALTH EFFECTS	WELFARE EFFECTS
<u>Ozone</u> Product of reactions of motor vehicle exhaust, industrial process emissions and other fossil fuel combustion emissions in the presence of sunlight.	Breathing difficulty, especially when exercising, irritates eyes, eyes, respiratory infections. Acute exposures cause bronchoconstriction, lung edema and abnormal lung development.	Toxic to plants by causing both leaf damage and a decrease in growth. Can weaken materials such as rubber and fabrics.
<u>Total Suspended Particulates</u> Fossil fuel combustion emissions, industrial process emissions, motor vehicle exhaust, traffic movement over dusty roads.	Critical for those with chronic lung diseases, altering the lungs' natural cleansing mechanism. They are composed of or adsorb to toxic materials. Particles smaller than 10 microns lodge deep in the lungs.	Cause soiling of materials, are corrosive and can damage buildings. Cause haze which reduces visibility and the amount of solar energy reaching the earth.
<u>Carbon Monoxide</u> Internal combustion engines, fossil fuel combustion, and cigarette smoking.	Reduces the blood's ability to carry oxygen which may cause heart and brain damage. Acute exposures can cause asphyxiation.	No known effect on materials or vegetation.
<u>Sulfur Dioxide</u> Fossil fuel combustion emissions.	Irritation of throat and lungs and aggravation of symptoms among those with chronic lung diseases such as asthma and bronchitis.	Corrosion and deterioration of metals, brittleness of paper, discoloration of paint and deterioration of fabric. Leaf damage to some plants impairs visibility. Contributes to acid rain.
<u>Nitrogen Dioxide</u> Emitted from motor vehicles and fossil fuel burning operations.	Aggravation of symptoms in those with asthma and chronic bronchitis and increased susceptibility to respiratory infections	Fading of dyes, yellowing of leaves on plants, and changing the horizon to a reddish brown color. Impairs visibility. Contributes to acid rain.

TABLE 2—CONTINUED
HEALTH AND WELFARE EFFECTS OF AIR POLLUTANTS

POLLUTANTS AND THEIR SOURCES	HEALTH EFFECTS	WELFARE EFFECTS
<u>Lead</u> Emitted from motor vehicle exhausts, some incinerators and smelters.	Mental retardation, brain and other organ damage.	No direct impact on vegetation.
<u>Sulfate</u> Emitted by coal and oil combustion, becomes the principal oxidation product of sulfur dioxide released into the atmosphere.	Enhanced respiratory toxicity of other air pollutants, chronic bronchitis and asthmatic attacks, and exacerbation of existing respiratory disease.	Principal pollutant responsible for acidic deposition and associated environmental damage, regional visibility impairment and arctic haze.

TABLE 3

ANALYSIS COLLECTION METHOD LISTING*

Sulfur Dioxide:			
14	Coulometric		
20	Pulse Fluorescent Instrumental		P. 20
Carbon Monoxide:			
11	Non-Dispersive Infra-Red Instrumental		P. 26
Ozone:			
11	Chemiluminescence Instrumental		
14	Ultraviolet Photometric		P. 29
Nitrogen Dioxide:			
14	Chemiluminescence Instrumental		P. 32
Total Suspended Particulates:			
91	High Volume Air Sampler	:	P. 35
Lead:			
92	High Volume Air Sampler		P. 41
Sulfate:			
91	High Volume Air Sampler		P. 49
PM10:			
01	Low Volume	Gravimetric	SA244E
52	High Volume	Gravimetric	SA321A
58	High Volume	Gravimetric	SA321B
			P. 51

* Corresponds to Instrument Method in Data Summaries.

TABLE 4 LIST OF EXCEEDANCES - PUBLIC SITES 1987

POLLUTANT	LOCATION	AQCR	ADDRESS	SAROAD	MO.	DAY	TIME	LEVEL REACHED
CARBON MONOXIDE (8 Hr. Average)	Boston	Met. Boston	340 Bremen St. - East Boston	0240-021	January	10	0500	10.5 mg/m ³
(1 Hr. Average)	Springfield	Pioneer Valley	1586 East Columbus	2160-007	January	15	1300	10.9 mg/m ³
NITROGEN DIOXIDE (Annual)	NO EXCEEDANCES	RECORDED						
LEAD (Quarterly)	NO EXCEEDANCES	RECORDED						
TSP	PRIMARY	EXCEEDANCES	RECORDED					
(Annual)	Charlestown	Met. Boston	One City Sq.	0240-027	July	20		106.5 ug/M ³
(24 Hr. Average)	Charlestown	Met. Boston	One City Sq.	0240-027	June	26		313 ug/M ³
					April	15		290 ug/M ³
								269 ug/M ³
SO ₂ (Annual)	NO EXCEEDANCES	RECORDED						
(24 Hr. Average)	NO EXCEEDANCES	RECORDED						
(3 Hr. Average)	NO EXCEEDANCES	RECORDED						
OZONE (Daily Hour Max)	Chelsea	Met. Boston	Powder Horn Hill	0380-003	July	24	1900	.126 ppm
	Chicopee	Pioneer Valley	Anderson Rd., Westover AFB	0400-008	July	13	1700	.141 ppm
	Easton-North	Southeast Mass.	Post Office, 300 Main St.	0535-001	June	19	1800	.136 ppm
	Fairhaven	Southeast Mass.	Leroy Wood School	0570-002	June	01	2100	.134 ppm
	Lawrence	Merrimack Valley	High St., Storrow Park	1000-005	June	29	1900	.126 ppm
	Newburyport	Merrimack Valley	NWR. HG Plum Island	1520-003	August	15	1500	.136 ppm
					August	17	1300	.127 ppm

TABLE 4 LIST OF EXCEEDANCES - PUBLIC SITES 1987

POLLUTANT	LOCATION	AQCR	ADDRESS	SAROAD	MO.	DAY	TIME	LEVEL REACHED
OZONE (Cont.)	Sudbury	Met. Boston		2196-001	June	29	1800	.143 ppm
					July	10	1300	.138 ppm
					July	11	1400	.126 ppm
					July	24	1800	.126 ppm

PM10 (Annual)		NO EXCEEDANCES	RECORDED					
(24 Hr.)		NO EXCEEDANCES	RECORDED					

II. PUBLIC SITE DIRECTORY - 1987

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED						
					SO ₂	CO	O ₃	NO ₂	TSP	Pb	PM10
PIONEER VALLEY AIR QUALITY CONTROL REGION (042)											
Agawam 152 South West- field St.	0030-003	692120 <u>4659040</u>	3	Rural Agri- culture			X				
Amherst Solar Habitat	0060-002	704310 <u>4696060</u>	3	Rural - Agricultural			X				
Chicopee Anderson Rd. Westover	0400-008	701800 <u>4674020</u>	3	Suburban - Commercial			X				
Holyoke 1 Court Square	0860-007	697480 <u>4675170</u>	12	Center City- Commercial					X		
Springfield 1586 E. Columbus	2160-007	699150 <u>4663550</u>	6	Center City- Industrial		X				X	X
Springfield Longhill Ave (Substations)	2160-009	700193 <u>4661928</u>	6	Center City- Commercial	X						
Springfield 59 Howard St. School	2160-011	699460 <u>4663380</u>	18	Center City- Commercial					X	X	X
Springfield Fernbank St.	2160-014	707080 <u>4668200</u>	4	Suburban - Commercial WS WD Temp		X					
Springfield Community Tech.	2160-015	700000 <u>4664500</u>	15	Center City- Residential	X			X			
Ware Quabbin Summit	2360-002	719700 <u>4686150</u>	5	Rural Agriculture WS, WD, Temp SO ₄ , NO	X		X	X	X		X
West Springfield Van Deene St.	2475-003	696400 <u>4663940</u>	7	Suburban - Commercial					X		

II. PUBLIC SITE DIRECTORY - 1987

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED						
					SO2	CO	O3	NO2	TSP	Pb	PM10
CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)											
Worcester 419 Belmont St. UMASS	2640-013	272400 4683700	5	Center City Residential					X		--
Worcester 2 Washington St. YWCA	2640-016	269100 4682200	8	Center City Commercial					X	X	X
Worcester State DPW Yard, Belmont Ave.	2640-019	272303 4683788	6	Center City Residential, WS, WD, Temp	X		X				
Worcester Thomas St. Fire Station	2640-020	269300 4683000	3	Center City Commercial, NO	X	X		X			

II. PUBLIC SITE DIRECTORY - 1987

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED						
					SO2	CO	O3	NO2	TSP	Pb	PM10
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)											
Boston Kenmore Square 590 Comm. Ave.	0240-002	<u>327100</u> 4690400	3	Center City Commercial NO, Temp	X	X		X		X	X
Boston Southampton St. Fire HQ	0240-012	<u>329580</u> 4688230	12	Center City Commercial					X		
Boston Visconti Street Callahan Tunnel	0240-016	<u>332000</u> 4692500	5	Center City Residential		X					
Boston 340 Breman St. E. Boston	0240-021	<u>330000</u> 4693550	4	Center City Residential NO	X	X		X	X		
Boston Essex St.	0240-022	<u>330100</u> 4690750	4	Center City Commercial		X					
Boston 200 Columbus Ave.	0240-024	<u>329400</u> 4690350	5	Center City Commercial					X		X
Boston One City Square Charlestown	0240-027	<u>330100</u> 4693030		Center City Residential					X	X	X
Chelsea Power Horn Hill	0380-003	<u>3399000</u> 46961500	4	Center City Residential WS, WD, NO	X		X	X	X		
Medford 100-120 Main St. Fire Headqtrs.	1220-002	<u>326300</u> 4697990	6	Center City Commercial					X		

II. PUBLIC SITE DIRECTORY - 1987

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED						
					SO ₂	CO	O ₃	NO ₂	TSP	Pb	PM10

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119) (Cont.)

Quincy Hancock St., Atlantic Fire Station	1880-007	332400 4682100	3	Suburban Residential					X		
Sudbury Watertown Rd. Natl. Wildlife	2196-001	303350 4695100	5	Rural Agricultural WS WD Temp			X				
Watertown Victory Field	2380-005	3203100 46935000	4	Center City Residential	X						
Woburn Pleasant St. Court House	2620-002	323000 4705000	12	Suburban Commercial					X		

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lawrence High St. Storrow Park	1000-005	342220 4730590	4	Center City Residential WS, WD	X		X		X		X
Lowell 35 YMCA Drive	1080-006	310370 4722640	7	Center City Commercial					X	X	
Newburyport NWR H Quarters Plum Island	1520-003	351300 4741600	4	Suburban Residential WS WD			X				

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

Brockton Crescent Street	0320-003	333300 4660400	10	Center City Industrial					X		
Easton-North 300 Main St. Post Office	0535-001	327050 4659170	5	Rural Near Urban WS WD			X				

II. PUBLIC SITE DIRECTORY - 1987

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED						
					SO ₂	CO	O ₃	NO ₂	TSP	Pb	PM10
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120) (Cont.)											
Fairhaven Leroy Wood School	0570-002	<u>343330</u> <u>4610800</u>	4	Suburban Residential WS WD			X				
Fall River 165 Bedford St.	0580-001	<u>321000</u> <u>4618000</u>	15	Center City Commercial Temp					X		
Fall River Globe St.	0580-004	<u>319700</u> <u>4616900</u>	5	Center City Commercial WS WD Temp	X						
New Bedford 25 Water St. YMCA	1500-004	<u>3395000</u> <u>46101100</u>	16	Center City Commercial					X		
Scituate First Ponsh Rd - Police Dept.	2020-001	<u>354000</u> <u>46730000</u>	15	Suburban Residential			X				
Truro Fox Bottom Nat'l Seashore	2275-001	<u>4158000</u> <u>46475000</u>	10	Rural			X				

II. PRIVATE SITE DIRECTORY - 1987

SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
					SO ₂	SO ₄	W/S	W/D	TSP	TEMP
PIONEER VALLEY AIR QUALITY CONTROL REGION										
Chicopee Grattan & Meadow	0400-006	697069 4672615	5	Suburban		X			X	
Hadley Russell St. Hopkin Academy	0789-001	698398 4690214	3	Rural	X					
Hadley Summit Hse, Mt. Holyoke	0789-002	629160 4685971	5	Rural	X					
Holyoke Mt. Tom Power Plant	0860-005	697554 4683012	3	Rural	X		X	X		
Holyoke Chmura Pool, Anniversary Park	0860-010	697200 4675680	3	Center City	X		X	X		
Northampton Elm St. Smith College	1600-003	694660 4687790	11	Center City		X			X	

II. PRIVATE SITE DIRECTORY - 1987

SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS					
					SAMPLED SO ₂	SO ₄	W/S	W/D	TSP	TEMP
PIIONEER VALLEY AIR QUALITY CONTROL REGION (Cont.)										
South Hadley Pine St. Sub- Station	2126-002	699012 <u>4679687</u>	3	Suburban	X					
South Hadley 23 Granview Street	2126-003	699400 <u>4676600</u>	3	Suburban	X		X	X		
Springfield Longhill Sub- Station	2160-009	700193 <u>4661928</u>	6	Center City	X	X			X	
Springfield Carew St. Sub-Station	2160-010	699855 <u>4666415</u>	4	Suburban	X					
Springfield Civic Center Rooftop	2160-012	699462 <u>4663692</u>	21	Center City		X			X	
Springfield Rose St. & Page Blvd.	2160-013	702346 <u>46683460</u>	5	Center City		X			X	
W. Springfield Agawam Ave. Power Plant	2475-002	698639 <u>4662867</u>	3	Center City	X					
W. Springfield Agawam Ave. Base Station	2475-004	723554 <u>4205400</u>	5	Center City	X					
W. Springfield Agawam Ave. #2	2475-005	699100 <u>4662800</u>	5	Center City	X					
W. Springfield Agawam Ave. #3	2475-006	699100 <u>4662750</u>	5	Center City	X					

II. PRIVATE SITE DIRECTORY - 1987

SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
					SO ₂	SO ₄	W/S	W/D	TSP	TEMP
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION										
Beverly E. Lothrop St.- Central Cemetery	0220-002	346600 4712400	3	Center City	X				X	
Boston 476 Atlantic Ave.	0240-018	330760 4690790	3	Center City	X	X			X	
Boston Long Island	0240-019	337595 4686595	5	Rural	X	X	X	X	X	
Boston Dewar St. Dorchester	0240-020	330548 4685952	6	Center City	X	X	X	X	X	
Boston Breman St. E. Boston	0240-021	332696 4693440	3	Center City	X	X	X	X	X	
Lynn 436 Lynnway St. GECO	1100-003	339171 4701463	-	Center City	X		X	X	X	
Marblehead Green St.	1160-003	347395 4707922	3	Suburban	X				X	
Peabody Meadow Pond - Glen Rd.	1780-004	341340 4708630	3	Suburban	X		X	X		
Peabody Fox Hill - Perkins St. Playground	1780-005	341130 4709640	3	Suburban	X		X	X		
Salem Fort Ave. Power Transm. Lines NEPC	1980-004	345900 4710100	3	Suburban			X	X		X

II. PRIVATE SITE DIRECTORY - 1987

SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS					
					SAMPLED SO ₂	SO ₄	W/S	W/D	TSP	TEMP

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (Cont.)

Stoneham Hill St. Hillside Garden Apts.	2180-001	326462 4704385	12	Suburban	X		X	X		
Wellesley Whitin Obs. Wellesley College	2420-001	310150 4684780	4	Suburban	X				X	

SOUTHEAST MASSACHUSETTS AIR QUALITY CONTROL REGION

Fall River Globe & Wilcox	0580-010	318960 4617230	3	Center City	X					
Fall River Manton & Second Street	0580-014	320020 4617400	30	Urban					X	
Swansea Sharps Lot Road	2230-001	317300 4624600	3	Suburban	X		X	X	X	X

MERRIMACK VALLEY AIR QUALITY CONTROL REGION

Haverhill Borman St. Nettle School	0840-002	3313850 47373650	9	Center City Residential	X		X	X		
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III. SAMPLING RESULTS FOR AIR QUALITY DATA

A. SULFUR DIOXIDE (SO₂)

1. Sampling Method

The pulse fluorescent instrument is used to analyze continuous SO₂ concentrations. In the pulse fluorescent method, SO₂ molecules are excited by ultra-violet light. In the process, the molecules emit distinctive light waves which vary in intensity according to the SO₂ concentration. The intensity is then measured to find specific SO₂ concentrations. The sampling method meets EPA equivalency requirements in 40CFR 50.1 (1981).

2. Summary of Data

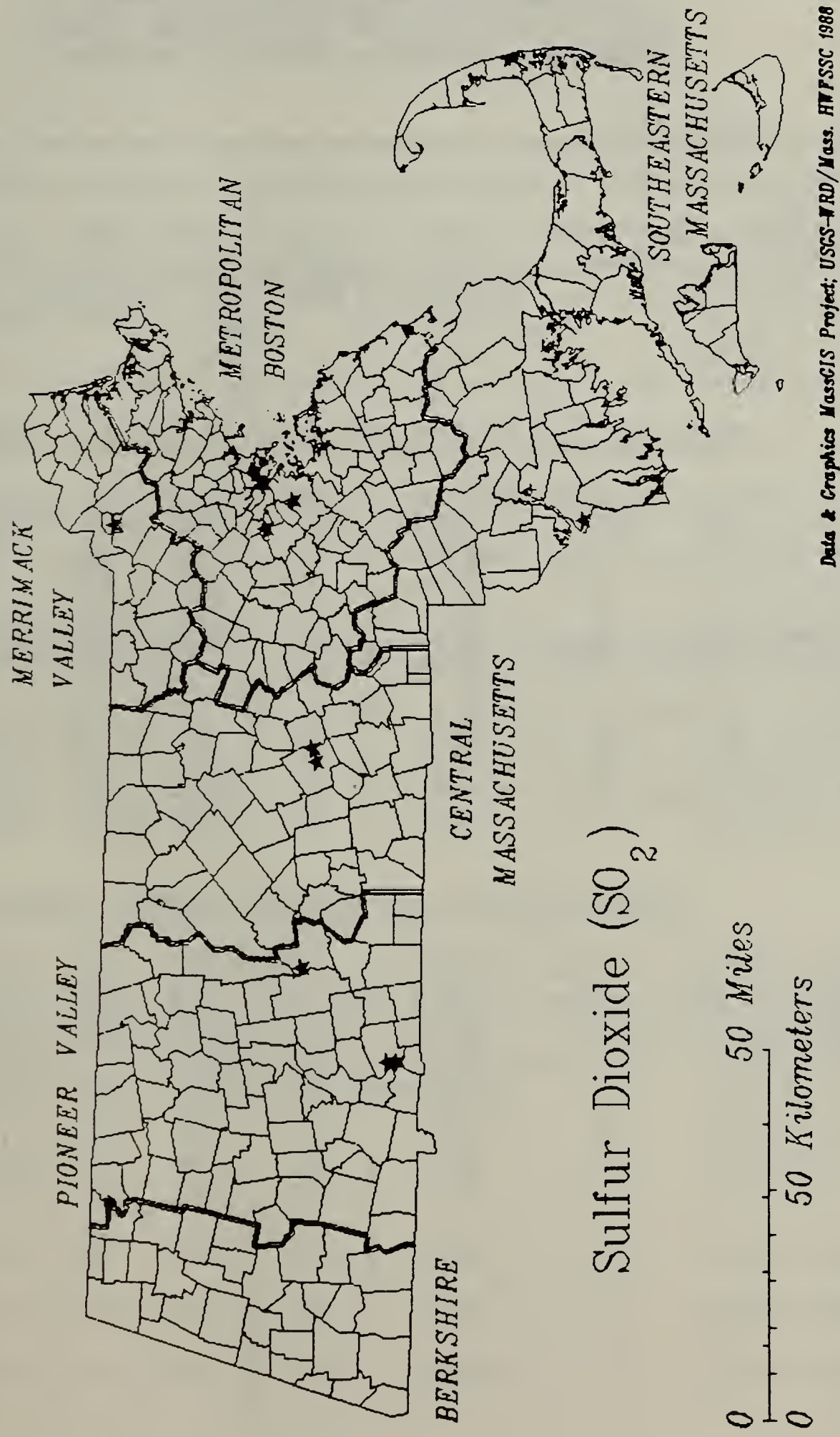
In 1987, eleven (11) SO₂ monitors were in the state-operated network (Figure 3). All of these sites operated at 86 percent or greater data capture. No violations of the National Ambient Air Quality Standards (NAAQS) for SO₂ were recorded in 1987. Table 5 shows that the highest annual average (44 ug/M³) was in the Metropolitan Boston urban area (0240-002). In 1987, data from 26 privately operated SO₂ monitors was quality assured and submitted to DAQC (Figure 4). All of these sites operated at 90 percent data capture or greater. No violations of the NAAQS were recorded. Table 6 shows that the highest annual average (37 ug/M³) occurred at four sites: Hadley (0789-002) and 3 West Springfield sites (2475-002, 2475-005, 2475-006).

(3) TABLE 5 - PUBLIC SITES
1987 SULFUR DIOXIDE MONITORING RESULTS

SO₂ units: ug/m³

Daily										
City	Saroad Site#	Instru- ment Method	Number of Hourly obs.	Annual Arith. Mean	Maximum 24 hr. obs Block		Maximum 3 Hr obs Block		Maximum 1Hr obs Block	
					1st	2nd	1st	2nd	1st	2nd
<u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION</u>										
Worcester	2640-019	20	8399	14	89	79	118	115	144	139
Worcester	2640-020	20	8554	23	136	100	262	197	333	314
<u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION</u>										
Lawrence	1000-005	20	8459	26	126	120	210	210	293	272
<u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION</u>										
Boston	0240-002	20	8039	44	144	128	293	272	448	443
Boston	0240-021	20	8294	34	131	120	259	233	296	291
Chelsea	0380-003	20	8039	30	123	118	299	267	323	315
Watertown	2380-005	20	8587	23	144	118	288	233	325	304
<u>PIONEER VALLEY AIR QUALITY CONTROL REGION</u>										
Sprngfld.	2160-009	20	8487	29	154	136	312	265	338	330
Sprngfld.	2160-015	20	7524	31	181	139	297	280	417	354
Ware	2360-002	20	8635	13	52	52	105	89	131	131
<u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION</u>										
Fall River	0580-004	20	8392	26	147	139	341	314	472	435

FIGURE 3: Continuous Air Sampling Network – Public 1987



Data & Graphics MassGIS Project; USCS-WRD/Mass. HWPSSC 1988

(5) TABLE 6 - PRIVATE SITES
1987 SULFUR DIOXIDE MONITORING RESULTS

SO₂ units: ug/m³

City	Saroad Site#	Instrument Method	Number of Hourly obs.	Annual Arith. Mean	Daily					
					Maximum 24 hr. obs. Block		Maximum 3 Hr. obs. Block		Maximum 1 Hr. obs.	
					1st	2nd	1st.	2nd.	1st.	2nd.

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

Beverly	0220-002	20	8711	18	113	89	250	168	294	278
Boston	0240-018	20	8243	34	131	121	251	233	359	312
Boston	0240-019	20	8066	21	113	102	236	233	294	268
Boston	0240-020	20	8252	29	131	278	278	223	370	312
Boston	0240-021	20	8152	31	126	113	254	223	296	278
Lynn	1100-003	20	8575	31	215	194	516	456	721	577
Marblehead	1160-003	20	8716	24	121	107	215	210	302	281
Peabody	1780-004	20	8575	29	162	121	246	243	325	323
Peabody	1780-005	20	8555	26	139	128	228	197	291	273
Stoneham	2180-001	20	8468	31	100	94	199	176	265	262
Wellesley	2420-001	20	8302	18	123	107	280	275	582	385

PIONEER VALLEY AIR QUALITY CONTROL REGION

Hadley	0789-001	20	8662	29	118	100	223	210	464	299
Hadley	0789-002	20	8651	37	134	115	338	273	904	587
Holyoke	0860-005	20	8677	26	187	76	257	244	438	399
Holyoke	0860-010	20	8622	24	134	107	233	204	440	288
S. Hadley	2126-002	20	8678	29	118	110	228	191	294	281
S. Hadley	2126-003	20	8341	13	131	84	183	178	220	202
Springfld	2160-009	20	8706	34	155	147	317	278	354	349
Springfld	2160-010	20	8727	34	178	131	238	238	378	354
W.Springfield	2475-002	20	8727	37	210	176	401	320	459	448
W.Springfield	2475-004	20	8674	34	207	162	453	406	503	495
W.Springfield	2475-005	20	8730	37	181	152	349	304	553	378
W.Springfield	2475-006	20	8654	37	265	157	480	474	655	650

(5) TABLE 6 - PRIVATE SITES (Cont.)

1987 SULFUR DIOXIDE MONITORING RESULTS

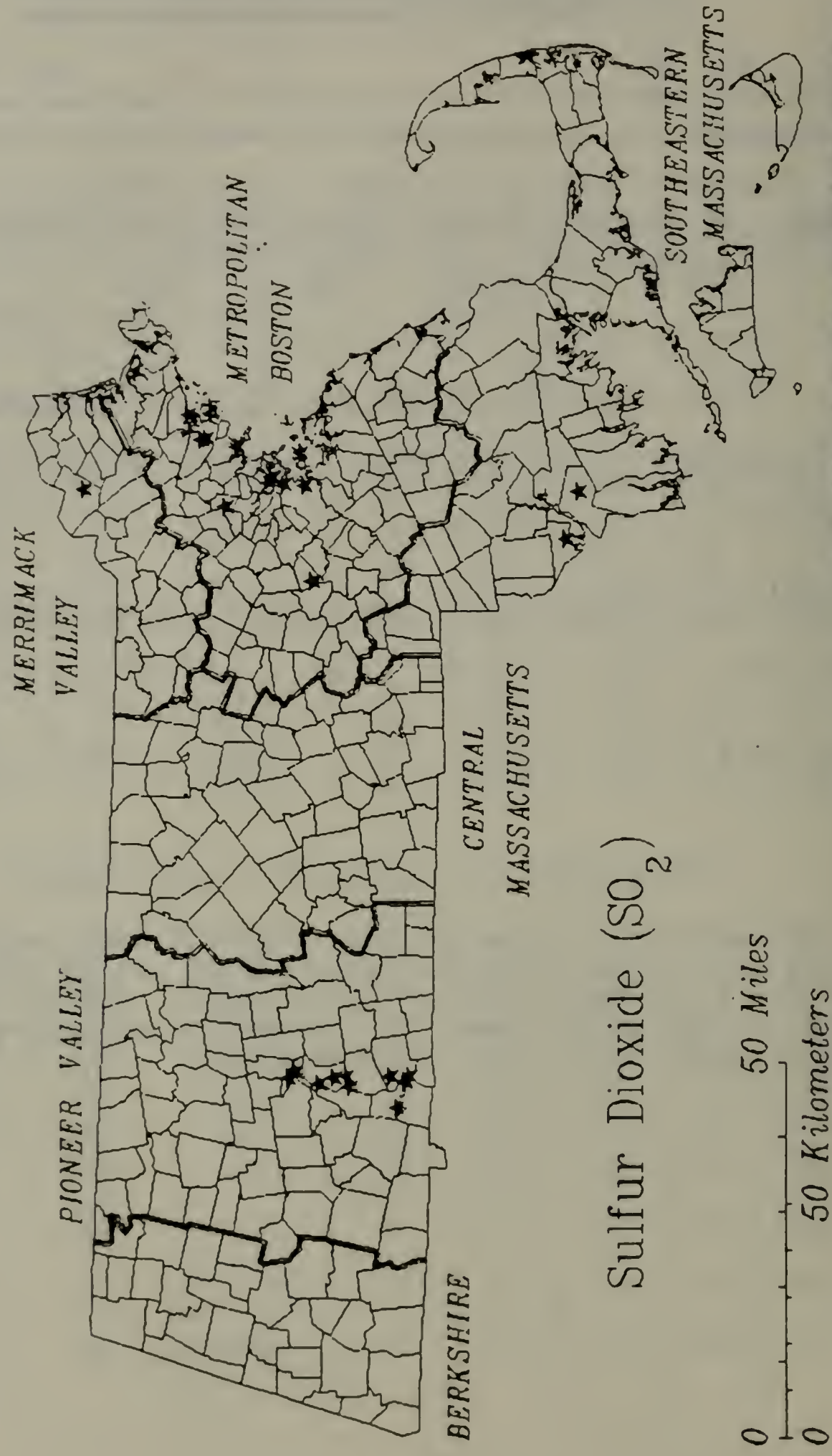
SO₂ units: ug/m³

Daily										
City	Saroad Site#	Instrument Method	Number of Hourly obs.	Annual Arith. Mean	Maximum 24 Hr. obs. Block		Maximum 3 Hr. obs. Block		Maximum 1 Hr. obs.	
					1st	2nd	1st.	2nd.	1st.	2nd.
MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)										
Haverhill	0840-002	20	7858	26	105	102	238	204	327	260
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)										
Fall River	0580-010	20	8699	29	189	176	532	424	668	582
Swansea	2230-001	20	8661	16	102	92	390	359	778	710

* Annual Arithmetic Mean based on less than 75% data capture.

** When total observations are less than 6,250, sample size is insufficient to represent sound data results for the year. Sulfur dioxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

FIGURE 4: Continuous Air Sampling Network - Private 1987



Data & Graphics MassGIS Project; USCS-WRD/Mass. HWFSSC 1988

B. CARBON MONOXIDE (CO)

1. Sampling Method

DAQC uses non-dispersive infrared (NDIR) analyzers for CO detection. These analyzers employ a short cell NDIR detection principle coupled with water vapor subtraction. This methodology meets equivalency requirements published by EPA in 40CFR 50.8, (1981).

2. Summary of Data

DAQC operated seven (7) CO monitors in 1987 (Figure 5). No violations of the one-hour CO National Ambient Air Quality Standards (40 mg/m^3) (NAAQS) were recorded in 1987. Table 7 shows that the maximum hourly CO value was 20 mg/m^3 at Worcester (2640-020). The 8-hour standard (10 mg/m^3) was exceeded 2 times in 1987, but not violated. To report a violation of the CO standard, two exceedances must be recorded at a single site. Both Boston (0240-021) and Springfield (2160-007) recorded the highest eight-hour average concentration (11 mg/m^3).

(3) TABLE 7 - PUBLIC SITES

1987 CARBON MONOXIDE MONITORING RESULTS

CO Units: mg/m³

City	Saroad Site #	Instrument Method	Number of Hourly obs.	Maximum		Maximum		# of 8 hr aver- ages above 10 mg/m ³
				1st 1hr.	2nd 1 hr.	1st 8 hr	2nd 8 hr	

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-020	11	8562	20	20	10	8	0
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

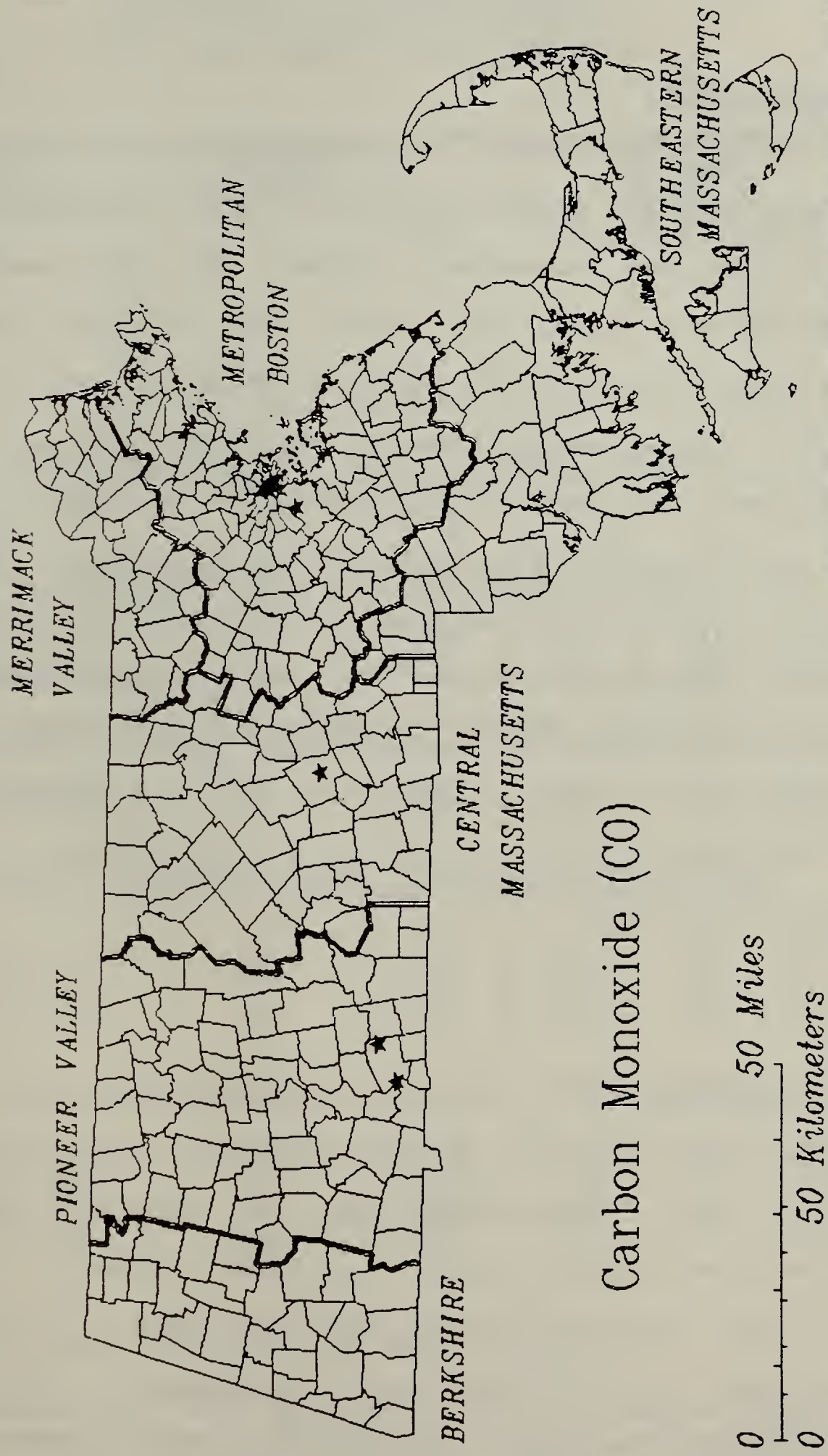
Boston	0240-002	11	8213	14	13	10	7	0
Boston	0240-016	11	1937	12	12	7	6	**
Boston	0240-021	11	8431	17	14	11	6	1
Boston	0240-022	11	8631	13	13	8	8	0

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Springfield	2160-007	11	8646	16	16	11	10	1
Springfield	2160-014	11	8430	12	12	6	5	0

** When total observations are less than 6,570, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site. Carbon monoxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

FIGURE 5: Continuous Air Sampling Network – Public 1987



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWFSSC 1988

C. OZONE (O₃)

1. Sampling Method

The chemiluminescence detection principle and the ultraviolet photometric analyzer method are used in the continuous measurement for ozone. In the chemiluminescence method, the ozone reacts chemically with ethylene gas, which emits light. The intensity of the emitted light is proportional to the amount of ambient ozone. In the ultraviolet method, the ultraviolet photometer gauges ozone concentrations by measuring the attenuation of light from ozone in the adsorption cell at a wave length of 254 nanometers. The concentration of ozone is inversely proportional to the amount of light being transmitted through the sample. Both methodologies meet equivalency requirements published by EPA 40CFR 50.9 (1981). The ozone season covers seven months of monitoring from April to October. During this period the highest peak of sunlight is available to mix and alter chemicals in the air.

2. Summary of Data

DAQC operated thirteen (13) ozone monitoring stations in 1987 (Figure 6). All but one of these sites (Scituate, 2020-001) operated at 84 percent or greater data capture. At seven stations the .120 parts per million 1-hour standard was exceeded (See Table 4, p.9). However, only two sites recorded more than one exceedance. Table 8 shows that the maximum ozone value was .143 ppm at Sudbury (2196-001).

(3)TABLE 8 - PUBLIC SITES
1987 OZONE MONITORING RESULTS

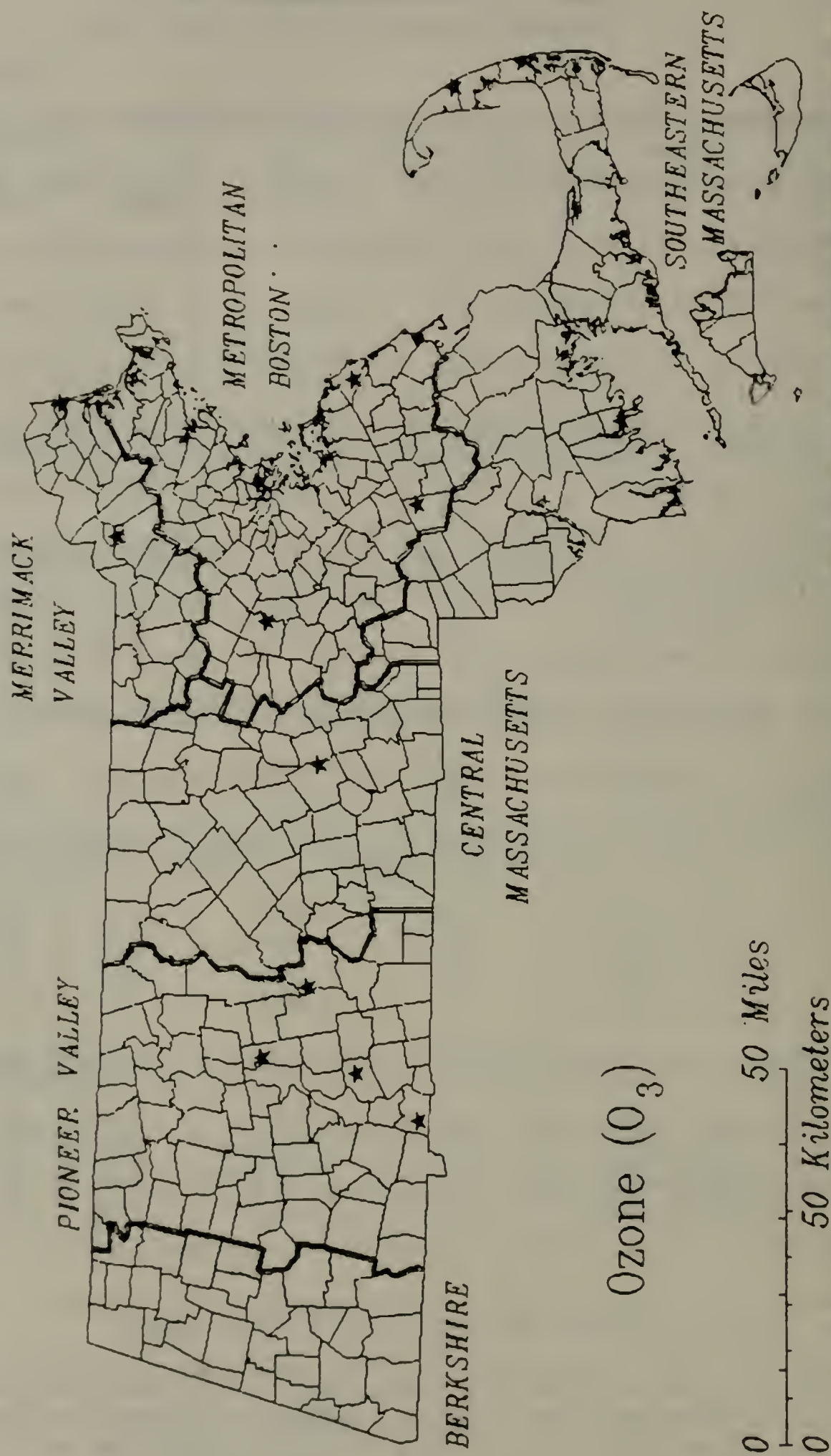
O₃ units = ppm

City	Saroad Site #	Instrument Method	# of obs.	Maximum 1 Hr. Obs.			Values = > .125 mea- sured for Daily Max
				1st	2nd.	3rd.	
<u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u>							
Worcester	2640-019	11	4999	.111	.111	.110	0
<u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u>							
*Chelsea	0380-003	14	7983	.126	.116	.115	1
Sudbury	2196-001	14	4732	.143	.138	.126	4
<u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u>							
Lawrence	1000-005	11	4849	.126	.110	.091	1
Newburyport	1520-003	14	4392	.136	.127	.119	2
<u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u>							
Agawam	0030-003	14	5019	.103	.102	.098	0
Amherst	0060-002	14	4979	.110	.097	.097	0
*Chicopee	0400-008	14	8443	.141	.121	.113	1
*Ware	2360-002	14	8616	.118	.106	.105	0
<u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)</u>							
Easton	0535-001	14	4838	.136	.124	.120	1
Fairhaven	0570-002	14	5063	.134	.124	.124	1
Scituate	2020-001	14	3292**	.118	.113	.109	0
Truro	2275-001	14	4302	.115	.115	.114	0

* Monitor records ozone data for the entire year.

** When total observations are less than 3,852 the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site; 100 percent data capture during the 4/1 to 10/31 ozone season represents 5,136 observations at each monitor.

FIGURE 6: Continuous Air Sampling Network - Public 1987



Data & Graphics MassGIS Project; USCS-WRD/Mass. HWPSSC 1988

(3) TABLE 9 - PUBLIC SITES

1987 NITROGEN DIOXIDE MONITORING RESULTS

NO₂ units: ug/M³

City	Saroad Site #	Instrument Method	Number of Hourly obs.	Maximum		Annual Arithmetic Mean
				1st hour	2nd. hour	

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-020	14	8517	316	306	64
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-002	14	7496	323	323	72
Boston	0240-021	14	8073	220	220	64
Chelsea	0380-003	14	8003	203	197	45

PIONEER VALLEY AIR POLLUTION CONTROL REGION (042)

Springfield	2160-015	14	8509	262	211	42
Ware	2360-002	14	7596	120	113	15

D. NITROGEN DIOXIDE (NO₂)

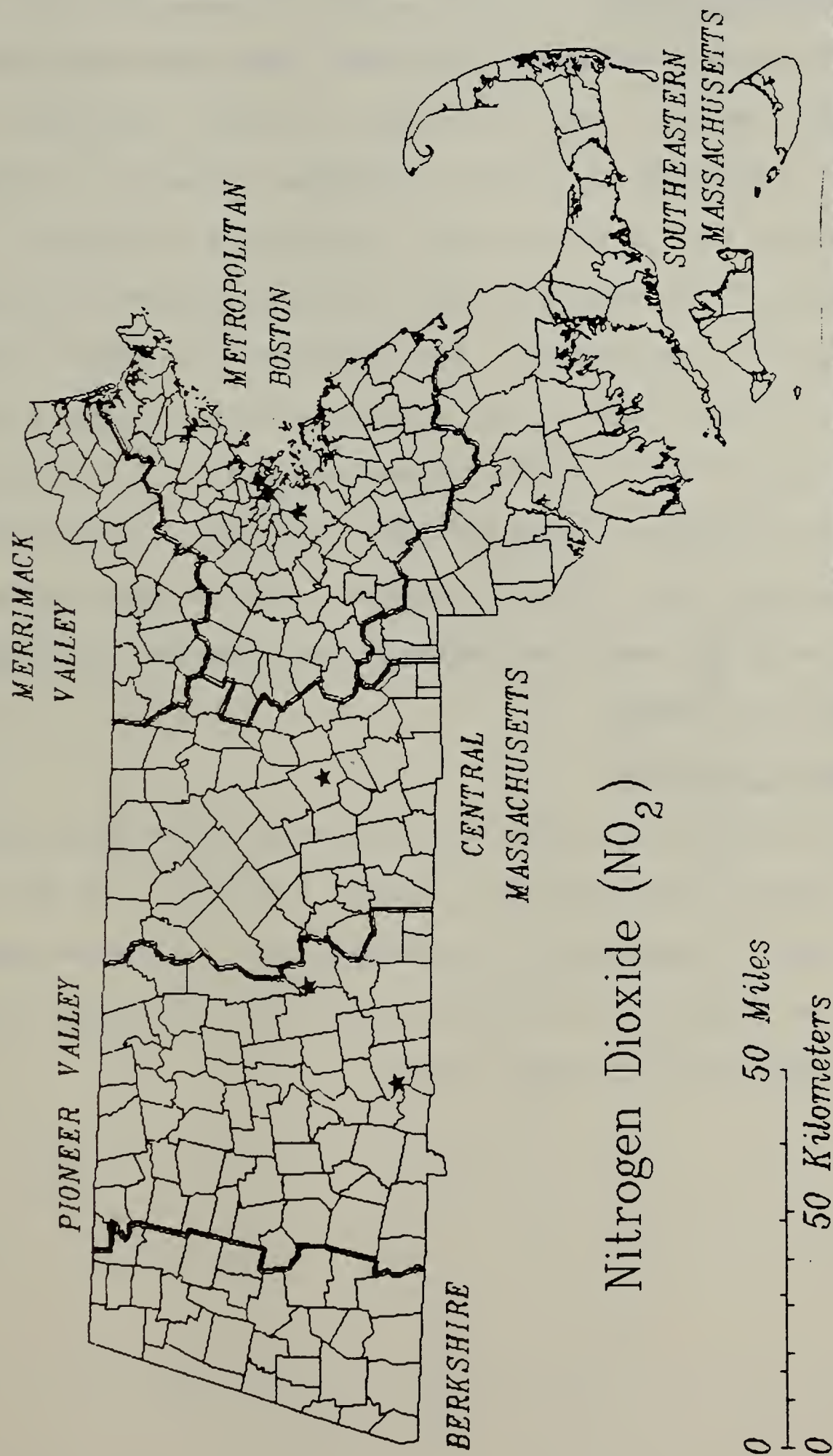
1. Sampling Method

NO₂ is measured by the chemiluminescence detection principle. In this method, nitric oxide (NO) and oxides of nitrogen (NO_x) react with ozone and the resultant chemical products emit light. The intensity of this light is proportional to the concentrations of NO_x and NO. The electronically calibrated difference between NO_x and NO is equal to the NO₂ concentration. This methodology meets equivalency requirements published by EPA in 40CFR 50.11 (1981).

2. Summary of Data

DAQC operated six (6) NO₂ monitoring sites in 1987 (Figure 7). All of these sites operated at 86 percent or greater data capture. There were no recorded violations of the National Ambient Air Quality Standard (NAAQS) for NO₂ for the annual average of 100 ug/m³. Table 9 shows that the highest NO₂ level (320 ug/M³) was recorded in Boston (0240-002).

FIGURE 7: Continuous Air Sampling Network - Public 1987



Data & Graphics MassCIS Project; USGS-WRD/Mass. HWFSSC 1988

E. TOTAL SUSPENDED PARTICULATES (TSP)

1. Sampling Method

TSP measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at a rate between 40 to 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. The difference in weight in milligrams is divided by the volume of air passed through, giving a weight per unit volume result, i.e., ug/M³. Upon completion of the TSP (weight/unit volume) calculation, several other physical and chemical tests can be performed upon the collected sample, such as lead and sulfate content. This methodology meets equivalency requirements published by EPA in 40CFR 50.6 (1981).

2. Summary of Data

In 1987, nineteen (19) TSP monitors were state-operated. Seventeen had at least 79 percent data capture for 1987. As TSP measurements are no longer regulated by standards, only collected data is reported here. The high values of Boston (0240-027) in Table 10 reflect highly active construction in this area.

Fifteen TSP monitors in 1987 were privately operated (Figure 9). All the sites had at least 84 percent data capture. Table 11 shows that the highest annual geometric mean (66 ug/M^3) was recorded at Boston (0240-018).

(3) TABLE 10 - PUBLIC SITES

1987 TOTAL SUSPENDED PARTICULATES MONITORING RESULTS

TSP Units: ug/M³

City	Saroad Site#	Number of Obs.	Minimum Obs.	1st.	Daily Maximum 2nd.	3rd.	Annual Arith. Mean	Annual Geo. Mean
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CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-013	58	8	92	77	71	44	39
Worcester	2640-016	48	29	119	110	94	59	56

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lawrence	1000-005	30**	18	79	78	76	*	*
Lowell	1080-006	58	10	143	120	90	49	44

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-012	54	25	190	174	150	69	63
Boston	0240-021	60	25	118	103	94	62	59
Boston	0240-024	59	28	132	112	109	66	63
Boston	0240-027	61	35	313	290	269	124	107
Brockton	0320-003	59	14	81	65	64	40	37
Chelsea	0380-003	59	17	95	85	77	47	44
Medford	1220-002	49	9	150	124	115	64	59
Quincy	1880-007	57	22	90	88	71	44	42
Woburn	2620-002	58	19	124	96	87	49	46

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Holyoke	0860-007	60	16	91	88	77	49	46
Springfield	2160-011	61	18	107	100	99	54	51
W.Springfld	2475-003	57	16	94	90	77	48	45
Ware	2360-002	105	1	61	60	57	20	16

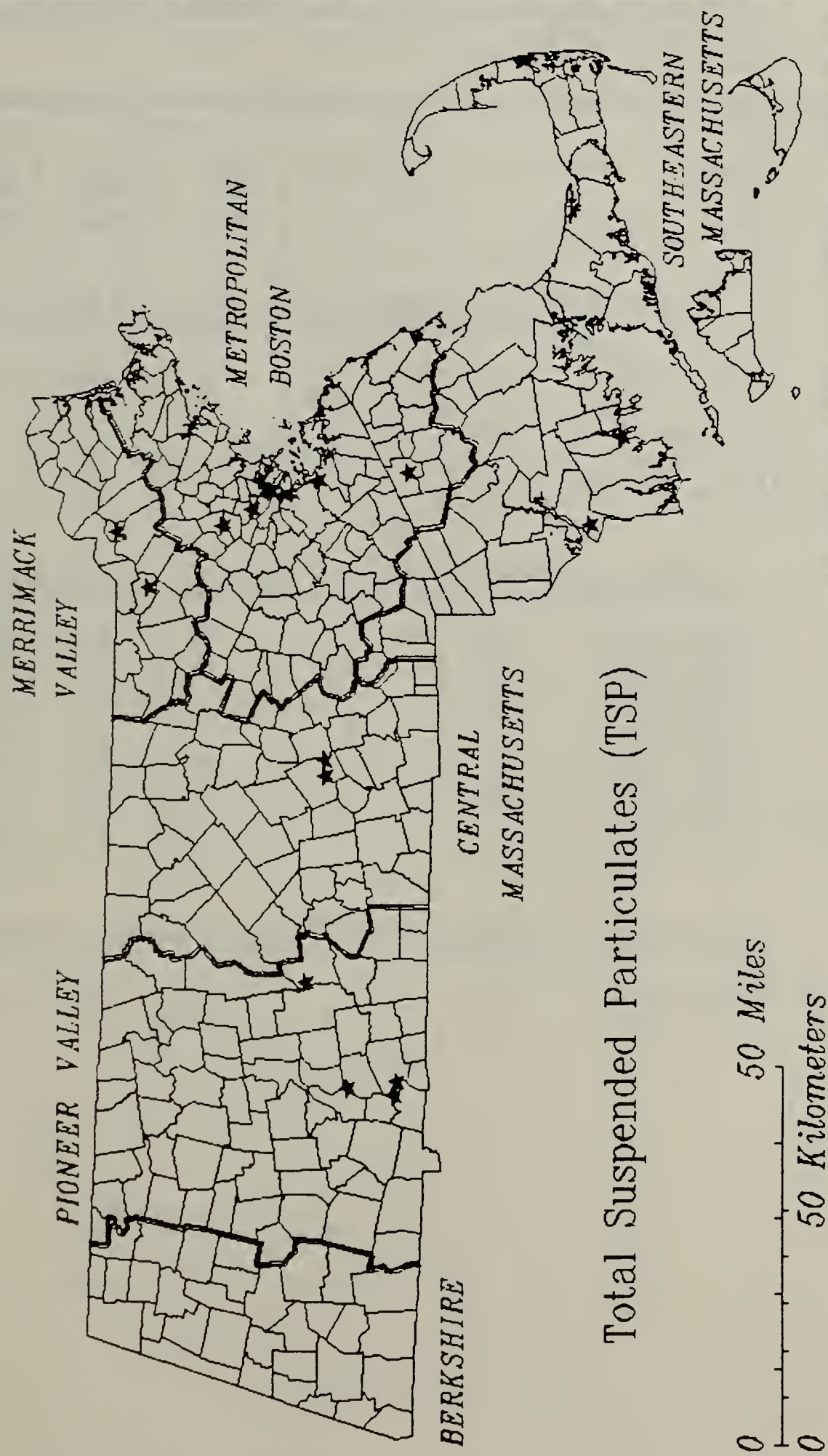
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

Fall River	0580-001	58	15	93	67	66	43	40
New Bedford	1500-004	56	12	73	71	62	40	37

* Annual Arithmetic Mean and Annual Geometric Mean could not be determined due to insufficient sample size.

** When total observations are less than 40, the sample cannot be guaranteed to contain the actual maximum concentration value for the year.

FIGURE 8: Air Sampling Network – Public 1987



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWPSSC 1988

(5) TABLE 11 - PRIVATE SITES

1987 TOTAL SUSPENDED PARTICULATES MONITORING RESULTS

TSP Units: ug/M³

City	Saroad Site#	Number of Obs.	Minimum Obs.	Daily 1st Max Obs.	2nd Max Obs.	3rd Max Obs.	Annual Arith. Mean	Annual Geo. Mean
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PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Chicopee	0400-006	57	9	201	112	99	54	46
Northampton	1600-003	61	8	82	66	57	35	33
Springfield	2160-009	58	11	119	105	82	44	39
Springfield	2160-012	51	13	95	87	86	48	44
Springfield	2160-013	53	8	90	89	82	44	37

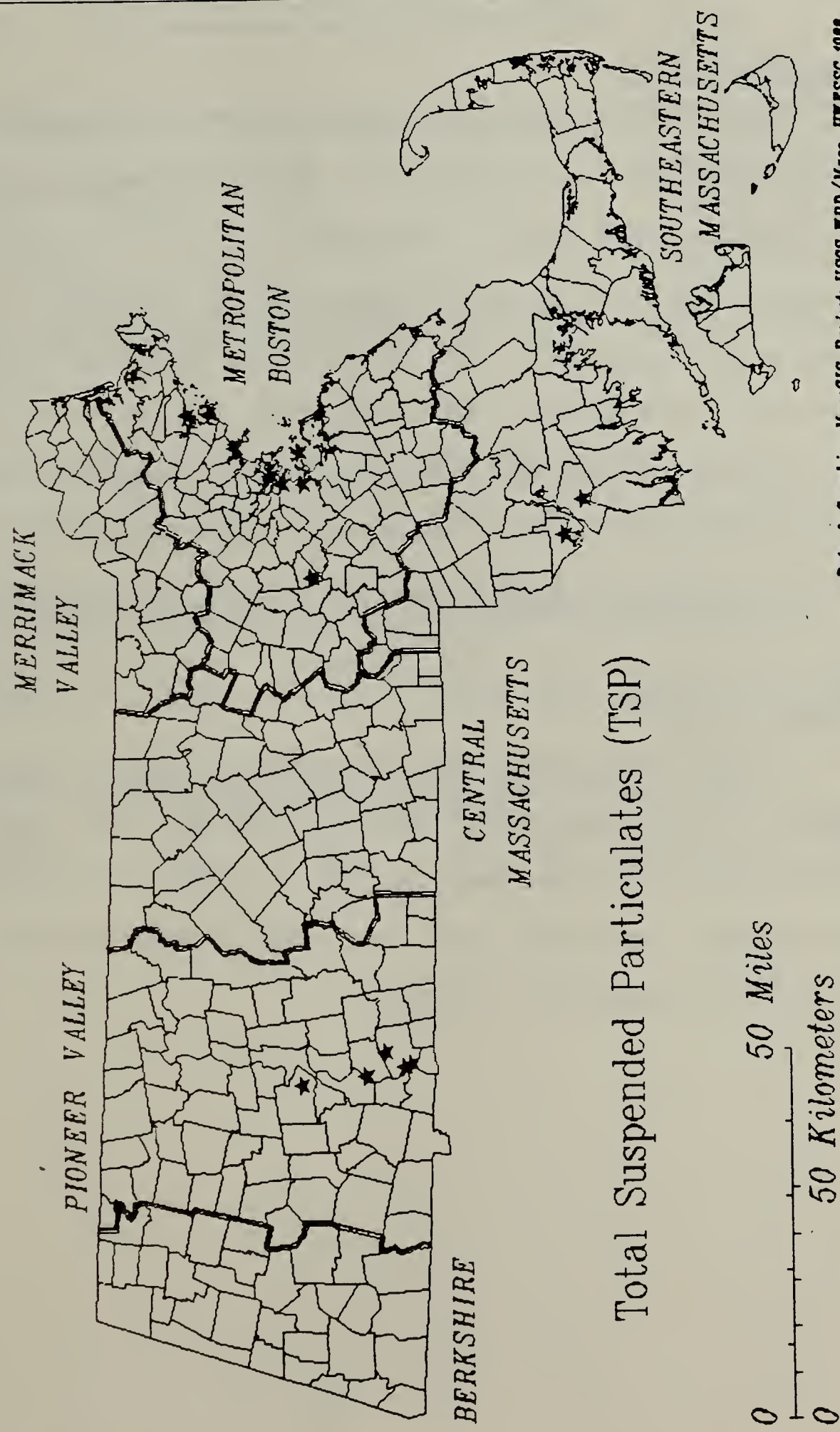
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

Beverly	0220-002	56	9	68	61	59	29	26
Boston	0240-018	57	30	122	119	111	69	66
Boston	0240-019	59	11	63	56	52	28	27
Boston	0240-020	57	22	84	73	67	42	40
Boston	0240-021	58	19	82	81	74	49	47
Lynn	1100-003	60	12	105	98	83	45	41
Marblehead	1160-003	54	8	80	66	65	35	32
Wellesley	2420-001	61	14	68	64	62	34	31

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION

Fall River	0580-014	57	21	76	65	64	39	37
Swansea	2230-001	56	8	90	67	60	31	28

FIGURE 9: Air Sampling Network - Private 1987



Data & Graphics MassGIS Project: USGS-WRD/Mass. HWFSSC 1988

F. LEAD (Pb)

1. Sampling Method

Lead measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at a rate between 40 to 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. This analysis continues with the filter cut and placed in a nitric acid bath. The solution is then passed through an atomic absorption analyzer. This methodology meets equivalency requirements published in 40 CFR 50.12 (1981).

2. Summary of Data

In 1987, six (6) lead monitors were state-operated (Figure 10). No exceedances of the three-month National Ambient Air Quality Standards (NAAQS) for lead were recorded in 1987. Table 12 and Figure 11 show that the maximum quarterly level occurred in Springfield (2160-007) with an arithmetic mean of .16 ug/M³.

(3)TABLE 12 - PUBLIC SITES
1987 LEAD MONITORING RESULTS

Pb units: ug/M³

City	Saroad Site#	Instrument Method	No. of Obs.	Daily Maximum Obs.		Arithmetic Mean Quarter			
				1st	2nd	1st	2nd	3rd	4th

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-016	92	46	.16	.11	.06	.05	.04	.04
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MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lowell	1080-006	92	54	.20	.20	.08	.04	.04	.06
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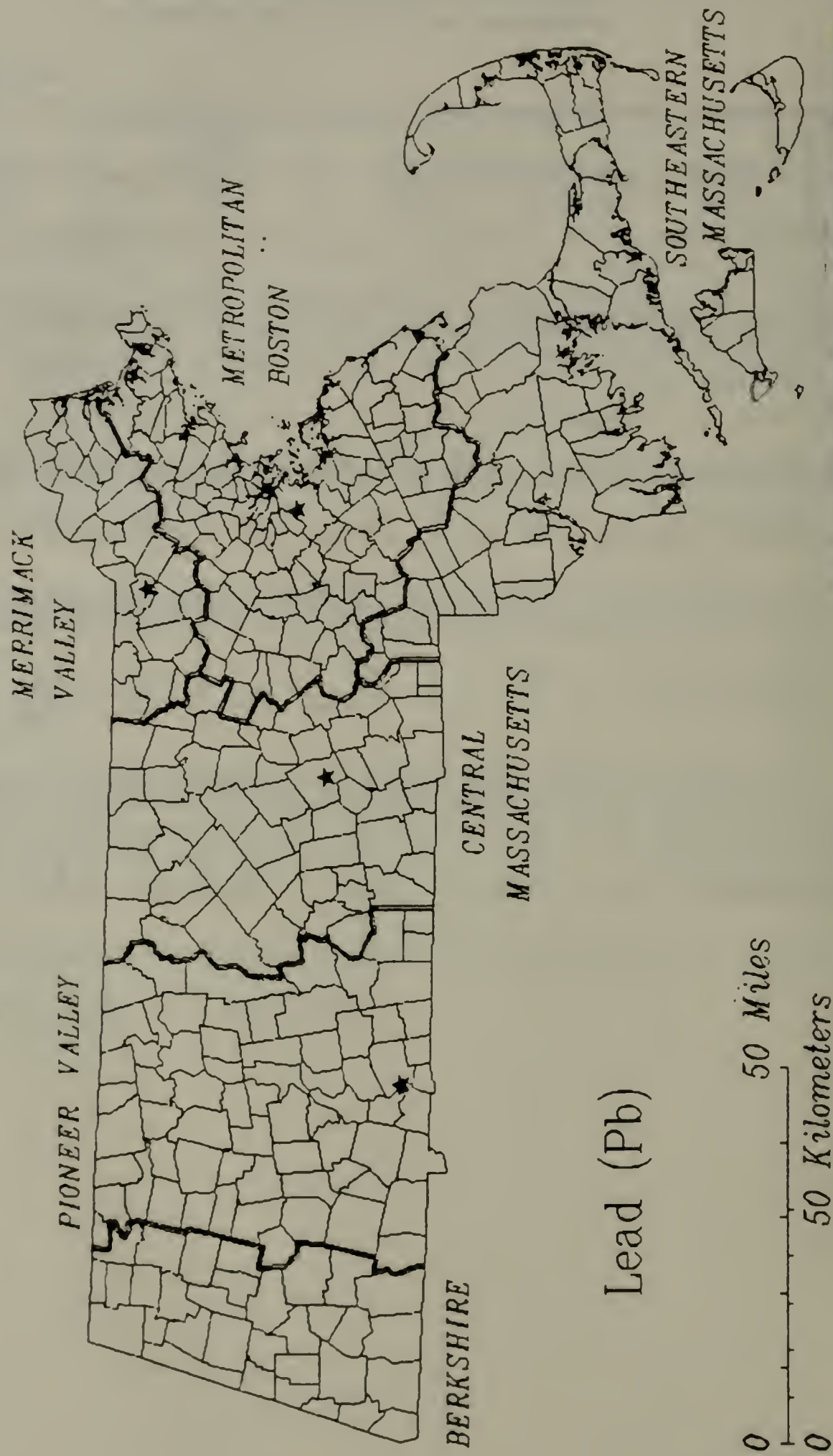
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-002	92	50	.29	.23	.11	.09	.11	.09
Boston	0240-027	92	54	.27	.26	.10	.12	.12	.07

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Springfld.	2160-007	92	57	.40	.34	.16	.11	.08	.10
Springfld.	2160-011	92	61	.21	.21	.11	.06	.06	.08

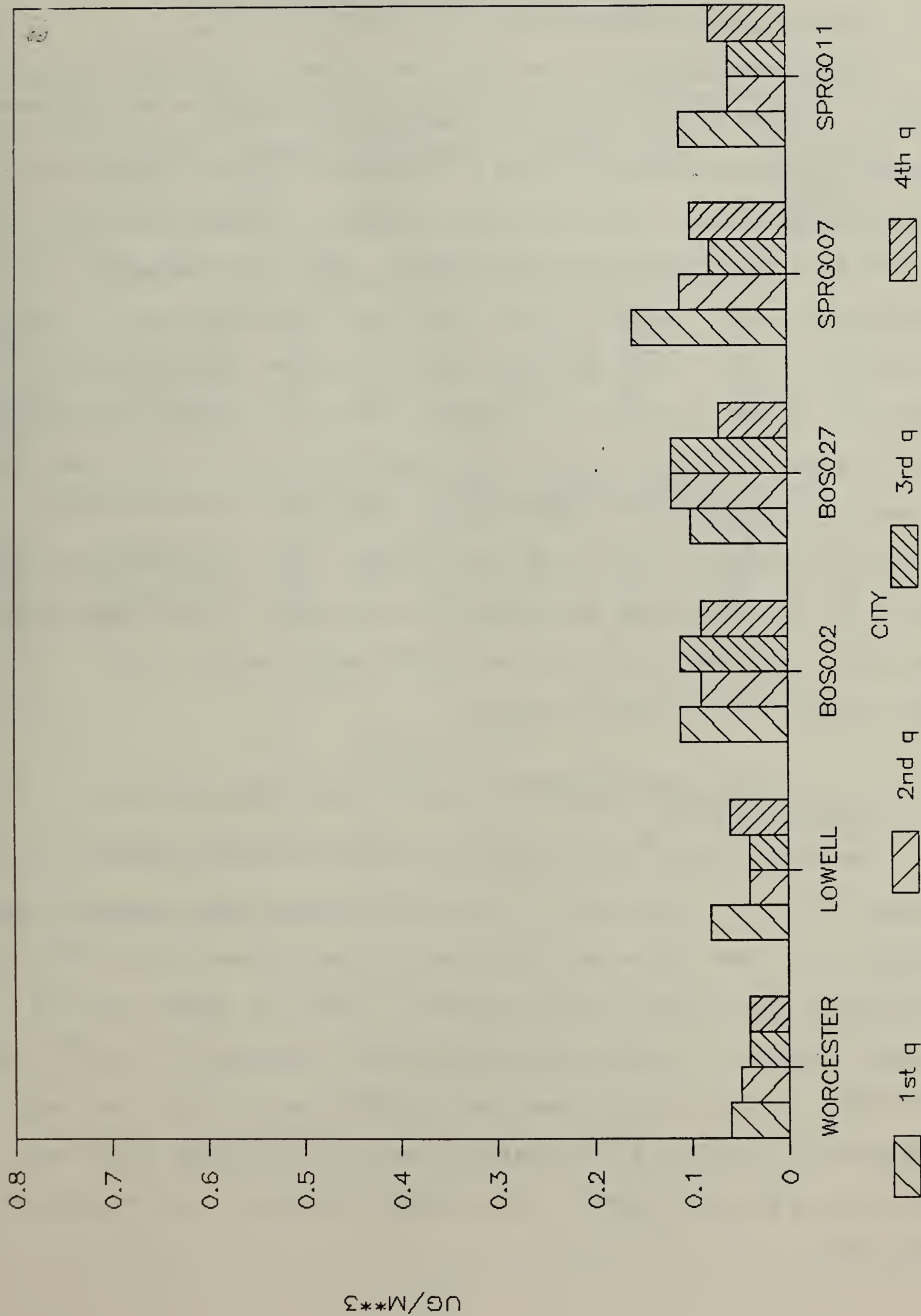
FIGURE 10: Air Sampling Network – Public 1987



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWFSSC 1988

Figure 11

QUARTERLY LEAD LEVELS



1. Sampling Method

Sulfate measurements are taken at private monitoring sites using a standard high volume air sampler (Method 91). In this procedure, air is drawn through a preweighed, 8"x10" fiberglass particulate filter. The filter is placed in a beaker with 40 milliliters distilled, deionized water. This is covered for 30 minutes and then poured through a Whatman #42 filter into a 200 ml. volumetric flask. Approximately 40 milliliters hot distilled, deionized water is added to a beaker, which is covered and left to sonicate for 10 minutes in an ultrasonic bath. The beaker and filter pieces are rinsed two or three times, and the diluent filtered and collected in a flask. At the conclusion of the sampling, the filter is removed and transported to the laboratory for analysis. The analysis involves turbidimetry using a Hach turbidimeter and sulfaver reagent.

2. Summary of Data

There were nine (9) privately-operated sulfate monitors in 1986 (Figure 12). The sites had at least 84 percent data capture. Sulfate monitors of these sites are operated by the Pioneer Valley Private Monitoring Group and by Boston Edison. Table 15 shows that the highest levels of sulfate were recorded at Chicopee (44 ug/M³, site 0400-006). Also included here is 1 public network site, at Ware (2360-002). Of the 58 observations made, the highest value was recorded in May (24 ug/M³). The monitor, however, was terminated in July, 1987.

(3) TABLE 13 - PRIVATE SITES
1987 SULFATES MONITORING RESULTS

SO₄ Units: ug/M³

City	Saroad Site#	Number of Obs.	Minimum Obs.	Daily Maximum Obs.		3rd.	Annual Arithmetic Mean
				1st.	2nd.		

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Chicopee	0400-006	57	2.5	44	26	24	10
Northampton	1600-003	61	2.2	26	19	17	9
Springfield	2160-009	58	2.8	29	22	18	10
Springfield	2160-012	51	3.9	27	21	19	9
Springfield	2160-013	56	0.9	32	21	18	9

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-018	56	0.6	26	18	16	9
Boston	0240-019	59	0.8	21	12	11	7
Boston	0240-020	58	1.0	23	21	14	8
Boston	0240-021	60	0.8	26	13	13	8

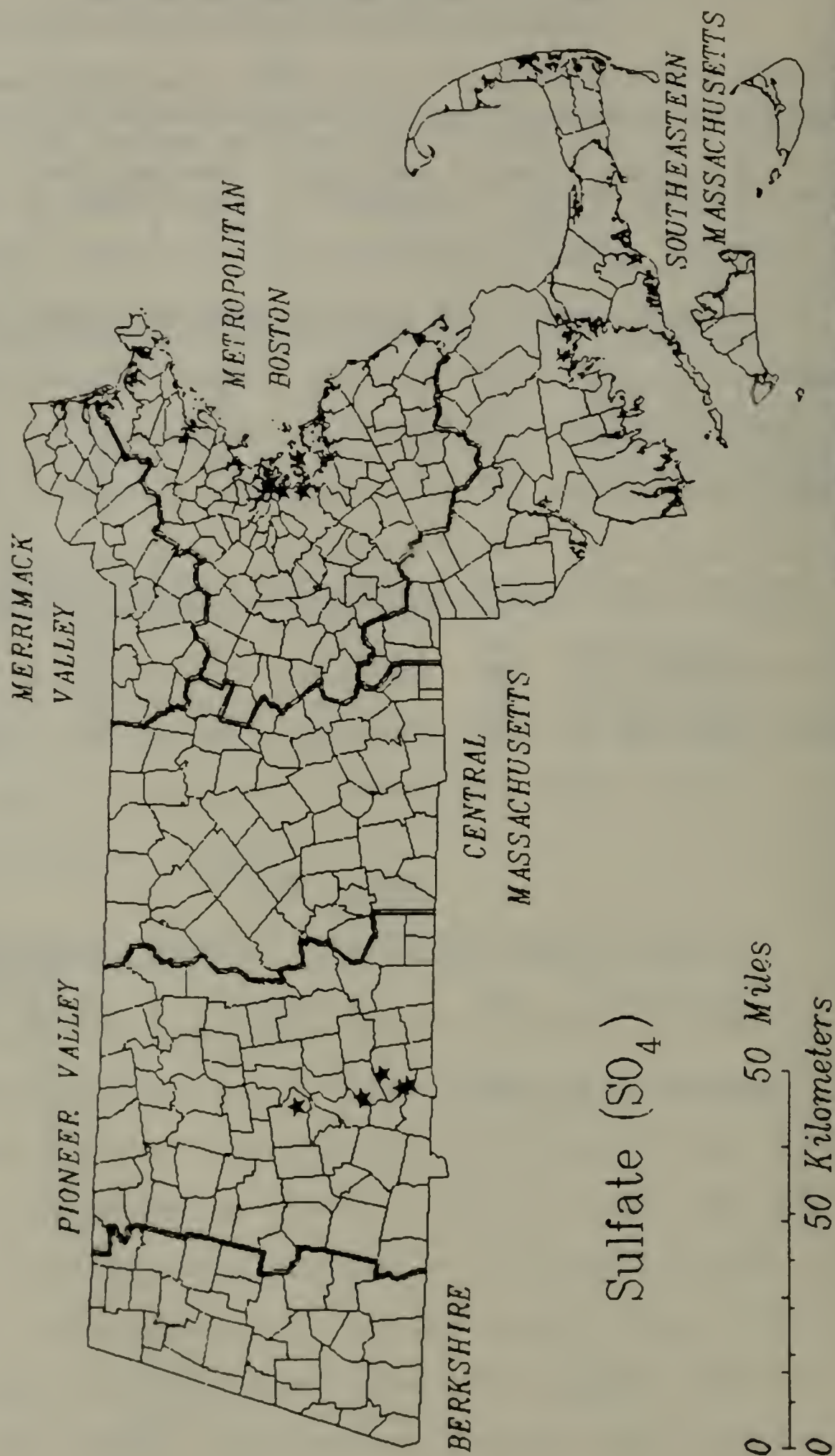
PUBLIC SITE

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Ware	2360-002	58	0.5	24	12	11	*
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*Monitor terminated in July, 1987.

FIGURE 12: Air Sampling Network - Private 1987



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWFSSC 1988

I. PARTICULATE MATTER ≤ 10 MICRONS (PM₁₀)

1. Sampling Method

DAQC employs size selective inlet devices (SSI), the high volume Anderson samplers (SA321A and SA321B) and the low volume Dichotomous sampler (SA244E), to record PM₁₀ levels. PM₁₀ refers to particulate matter less than 10 micrometers in aerodynamic diameter. Thus, gravimetric measurement of PM₁₀ involves direct weighing of selected particles removed from a known volume of air. The total weight of collected particles is divided by the volume of air sampled to arrive at the pollutant concentration. Samples taken with the high volume method are collected on an 8x10 inch quartz filter. Though the Dichotomous sampler also filters a known volume of air, particles are collected on two 50 mm. round teflon filters. This method allows for distinction between particulates measuring 0-2.5 micrometers and 2.5-10 micrometers, collecting them on separate filters. To obtain the PM₁₀ total, particulate weight of both filters are summed. The Anderson sampler (SA321B) meets equivalency requirements published by EPA in its "List of Designated Reference and Equivalent Methods," on March 7, 1988. Particulate matter is of such great concern since the small particle size allows the pollutant to lodge deep in the lungs.

2. Summary of Data

In 1987, eight (8) state operated sites monitored PM₁₀ (Figure 13). Seven sites used the high volume (SA321A, SA321B) method. None of the sites exceeded the standard. Springfield (site 2160-007, 105 ug/M³, daily) and Springfield (site 2160-011, 123 ug/M³ daily) recorded the highest levels (Table 16). Two sites, Boston (0240-002) and Ware (2360-002), used the Dichotomous sampler. The maximum 24 hour value recorded with this instrument occurred in Ware (56 ug/M³) for PM fine and in Boston (0240-002) for PM coarse (38 ug/M³).

TABLE 14 - PM10 PUBLIC SITES⁺

1987 SUMMARY

PM₁₀ units: ug/M³

City	Saroad #	Instrument Method	Number of Obs.	Max Daily Obs.	2nd Max Obs.	3rd Max Obs.	Annual Mean
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CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION

Worcester	2640-016	52	28*	54	53	49	**
		58	15*	37	34	26	**

MERRIMACK VALLEY AIR QUALITY CONTROL REGION

Lawrence	1000-005	52	19*	65	47	44	**
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

Boston	0240-002	58	37*	68	66	61	**
Boston	0240-024	52	15*	86	46	35	**
		58	39*	59	58	52	**
Charlestown	0240-027	52	19*	59	59	56	**
		58	39*	83	75	72	**

PIONEER VALLEY AIR QUALITY CONTROL REGION

Springfield	2160-007	52	36*	57	56	54	**
		58	21*	105	98	82	**
Springfield	2160-011	52	20*	90	84	52	**
		58	34*	123	51	48	**

City	Saroad #	Instrument Method	PM Range	Number of Obs.	Max Obs.	2nd Max Obs.	3rd Max Obs.	Annual Mean
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

Boston	0240-002	01	0-2.5	66	50	50	43	19
			2.5-10	67	38	31	30	12

PIONEER VALLEY AIR QUALITY CONTROL REGION

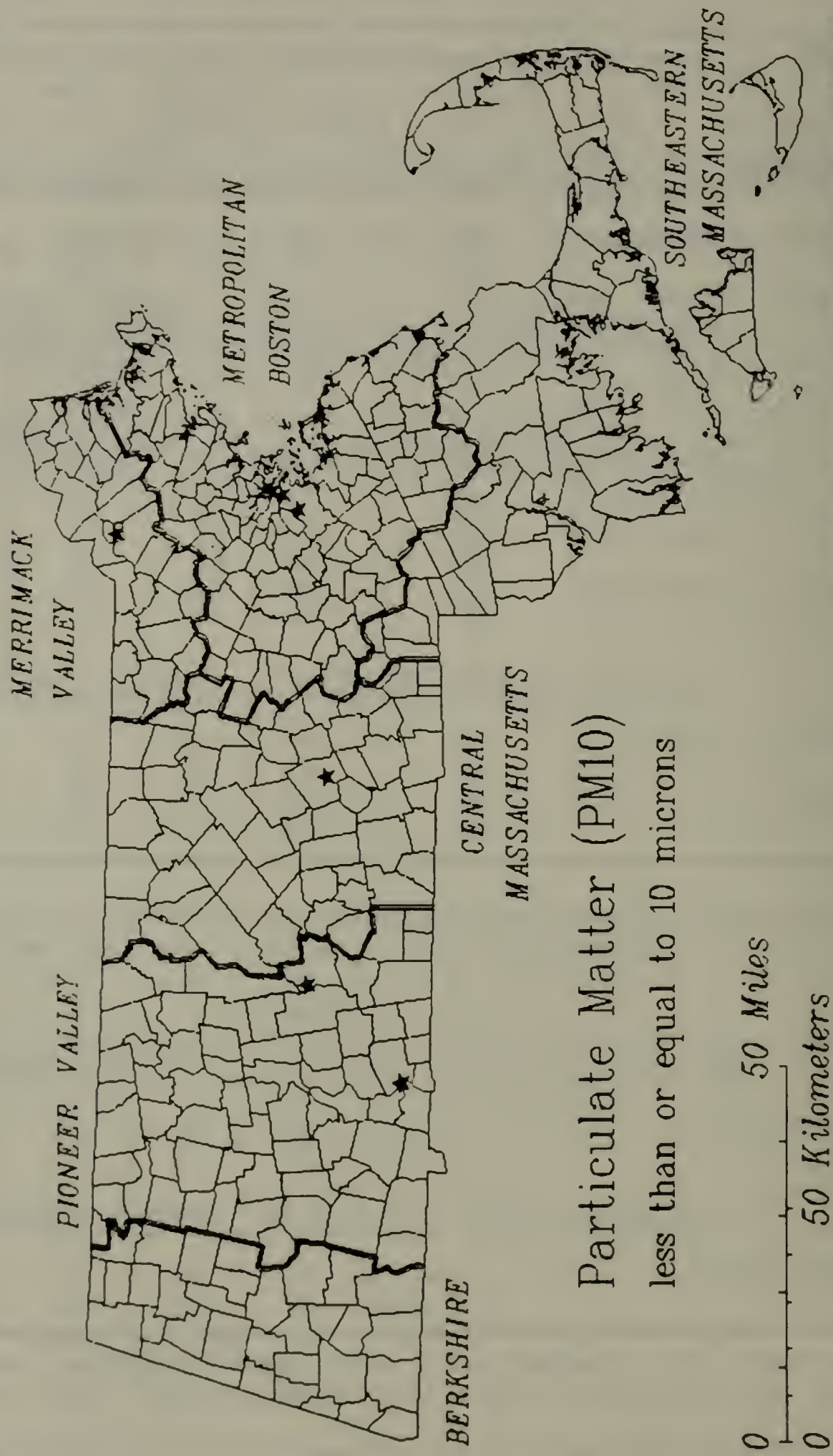
Ware	2360-002	01	0-2.5	90	56	36	35	11
			2.5-10	81	16	10	10	5

⁺ Sites with '**' changed instrument methods midway through the year, except for Lawrence, which shut down in May, 1987, and Boston (0240-002).

* Annual Mean could not be determined due to insufficient sample size.

** Total observations of 45 are required to have a 75% data capture. A maximum data capture is 61 observations.

FIGURE 13: Air Sampling Network – Public 1987



Data & Graphics MassGIS Project; USGS-WRD/Mass. HWPSSC 1988

G. POLLUTANT STANDARD INDEX (PSI)

1. Definition

The Pollutant Standard Index in Massachusetts provides a simple, uniform way to report ozone levels and their relationship to the health standard. The predominant form of photochemical oxidants (a component of smog). Through its statewide ozone monitoring network, DAQC evaluates the previous day's ozone level and predicts the following day's ozone concentration based on the analysis, NO_x values and on weather forecasts. Ozone is formed when volatile organic compounds combine with nitrogen oxides in the presence of sunlight. A PSI value of 100 is equivalent to the national ambient air quality standard for ozone (.120 ppm). DAQC reports ozone PSI values daily during the months of April through October for three areas: Eastern, Central, and Western Massachusetts.

(2) TABLE 15 PSI Index and General Health Effects

Index Value PSI Descriptor *	General Health Effects	Cautionary Statements
500		
hazardous	Premature death of ill and elderly. Healthy people will experience adverse symptoms that affect their normal activity.	All persons should remain indoors, keeping windows and doors closed. All persons should minimize physical exertion and avoid traffic.
400		
hazardous	Premature onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons.	Elderly and persons with existing respiratory diseases should stay indoors and avoid physical exertion. General population should avoid physical activity.
300		
very unhealthful	Significant aggravation of symptoms and decreased exercised tolerance in persons with heart or lung disease with widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors and avoid physical activity.
200		
unhealthful	Mild aggravation of symptoms in susceptible persons, with irritation symptoms in the healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity.
100		
moderate		
50		
good		
0		

* American Lung Association

TABLE 16 1987 PSI by Region

This table represents the number of days during the ozone season (April-October) that fell into the good, moderate, and unhealthy categories. In 1987, there were no days in the very unhealthy category.

<u>Month</u>	<u>PSI</u>	<u>Eastern Region</u>	<u>Central Region</u>	<u>Western Region</u>	
APRIL	Good	23	25	26	=
	Moderate	7	5	4	
	Unhealthful	0	0	0	
MAY	Good	17	17	18	
	Moderate	14	14	13	
	Unhealthful	0	0	0	
JUNE	Good	14	13	16	
	Moderate	14	17	14	
	Unhealthful	2	0	0	
JULY	Good	8	17	15	
	Moderate	19	14	14	
	Unhealthful	4	0	2	
AUGUST	Good	12	17	17	
	Moderate	17	14	14	
	Unhealthful	2	0	0	
SEPTEMBER	Good	19	27	26	
	Moderate	11	3	4	
	Unhealthful	0	0	0	
OCTOBER	Good	28	27	29	
	Moderate	3	4	2	
	Unhealthful	0	0	0	
TOTAL	Good	121	143	147	
	Moderate	85	71	65	
	Unhealthful	8	0	2	

